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ABSTRACT

After a review was made of the literature related to early identification of reading problems, a battery of diagnostic tests was constructed of receptive and expressive language elements assumed necessary for success in reading. After pilot work and revisions, the battery (PDQ) was administered to 916 entering kindergarten pupils by their teachers, in individual sessions. After testing, follow-up workshops were held with kindergarten teachers to provide suggestions for individualization based on the test results. The effect of the program was evaluated by comparing reading test scores at the end of first grade with those from a comparable population of first graders in the previous year who had not had the kindergarten testing program. Results indicated a significant difference in mean reading achievement in favor of the experimental group. (AA)

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A DIAGNOSTIC/PRESCRIPTIVE APPROACH TO EARLY IDENTIFICATION AND ITS EFFECT ON FIRST-GRADE READING ACHIEVEMENT *

For a number of years this researcher has been concerned with the difference between what "Early Identification" ought to be and what it usually is. Early identification ought to be a procedure for assessing all children to determine what skills they already have and those they still need in order to be successful in reading; it ought to imply direct and more individualized instruction in kindergarten.

In contrast, the usual identification procedures are what typical titles imply: They are efforts at "predicting reading failure." At best, these programs--whether conducted in kindergarten or at the pre-

* This study was made possible through funding by the Edyth Bush Charitable Foundation and the cooperation of teachers and administrators in Arlington Heights, Marquardt, and Schaumburg, Illinois.

kindergarten level--are usually procedures for screening out children who need special education. Too often, however, the programs merely use correlational items to initiate the self-fulfilling prophecy. The usual procedure goes something like this:

1. Children are tested with items that correlate with reading success.
2. Those who score low are identified as "poor risk" and are assigned activities unrelated to reading skill development.
3. Subsequent evaluation of reading achievement reveals that these children did indeed fail, therefore the tests were "good."

How well this procedure works was demonstrated by Fry (1965) using eight first-grade classes, randomly assigned to "readiness" and to reading instruction. While one group was learning to read, the "readiness" group was engaged in activities unrelated to reading. The results of achievement testing were never in doubt.

Yet these kinds of predeterminations continue. Typical is the case reported by Book (1974). Kindergarten children were screened using IQ scores, Metropolitan Readiness Tests, and the Bender-Gestalt. Based on scores, the children were neatly pigeon-holed into one of six categories, ranging from mentally retarded to enrichment. Comparison of placement with reading achievement at the end of grade one resulted in the nearly perfect correlation of .99.

Rather than being pleased with such "successful" predictions, educators ought to be angry that something wasn't done to thwart the

prediction. After all, to alert a kindergarten teacher to a "poor risk" might be helpful if she is buying stock and has the choice of avoiding risk; in the case of her children, she has no such choice and therefore must discover why the child is a "poor risk" and what she can do to help that child be a better risk.

Concerns such as these led to PDQ (Hillerich, 1974), an early testing procedure for pre-kindergarten children. Items were selected for inclusion not because they correlated with reading achievement but because they had diagnostic value, i.e., they had direct implications for follow-up instruction to remove the deficits identified and thereby to avoid any anticipated failure.

Evidence Relating to Correlational Items

To begin with, let's clarify two very basic terms often misunderstood by those who only occasionally read statistical studies. Correlation means merely that a "co-relationship" exists; it does not imply cause-effect. For example, there is a positive correlation between the height of elementary pupils and their reading achievement (compare first graders and sixth graders), but stretching kindergarten children will not increase their reading ability.

Secondly, statistical significance does not necessarily imply practical significance. It merely means that, given the same procedures, one is most likely to get similar results; in other words, the outcome was not a result of chance.

Unfortunately--at least in the view of this author--most tests used in early identification attempts only correlate with reading success or failure; they do not have a cause-effect relationship.

As a result, such tests have no diagnostic value since they present the teacher with no implications for her instructional program (other than the implied avoidance of instruction "because the child is not ready").

Many procedures, devices, and tests have been used in various attempts to predict reading success/failure. DeHirsch and Jansky (1966) investigated thirty-seven tests in their preliminary study. While many of the tests correlated significantly with reading, again the reader is reminded of the meaning of both correlation and significance. Only two tests in the entire battery reached a correlation above .50, which in itself is only about thirteen percent better than chance.

Following are some of the more commonly used criteria or tests along with comments as to their predictive and diagnostic value.

Chronlological Age. Jansky and deHirsch (1972) reported that chronological age does not correlate significantly with reading. Their view has been supported by others, including Wolf's findings (1972) in a study of four-year-olds, where the correlation between age and success in reading skills was .34, i.e., about seven percent better than chance.

Mental Age/IQ. Typical correlations in the area of .44 (about twenty percent better than chance) at primary level suggest this is not an important factor in predicting reading success/failure. In fact, Durkin (1962) found no correlation between the Kuhlman-Anderson IQ and success in reading.

Even if the correlation were much better, this writer sees the

typical use of IQ or Mental Age as a fatalistic procedure, classifying the child away from intensive instruction. Actually, the lower a child's ability the more help he should get. Further than this, any diagnostic implications for reading are nonexistent.

Socio-Economic Status (SES). Jansky and deHirsch (1972) reported SES does not correlate significantly with reading success/failure. While others might argue the point, this author supports their finding from a purely pragmatic view: Too often low SES has been used as an excuse for not teaching. Besides, here again we have no diagnostic information: The teacher cannot change the child's SES.

Neurological Deficits. Jansky and deHirsch (1972) are in agreement with Bond and Tinker (1973) in stating that neurological deficits are not clearly a cause of reading failure. Like any physical deficit, this factor offers no direct implication for reading instruction.

Emotional Problems. This is an area that has never been resolved satisfactorily through research. In terms of reading implications, however, we know that success will not aggravate an emotional problem; failure will. Hence, the existence of an emotional problem should be no excuse for avoiding appropriate reading instruction while help is being given on the emotional problem itself.

Reading Readiness Tests. Of the many studies done with readiness tests, typical correlations with reading range from .40 to .60, i.e., eight to twenty percent better than chance. Karlin (1957) found the forecasting efficiency of the Metropolitan Readiness Test to be only four percent better than chance. Certainly an individual child cannot be classified on such a basis. More to the point, readiness tests

offer no positive implications for instruction in reading.

Teacher Judgment. Kindergarten teachers usually can identify accurately the child who is going to have difficulty in reading. Often their diagnosis is that the child is "immature." This author does not question the accuracy of the prediction; on the other hand, such predictions also have no diagnostic implications for instruction; moreover, they often come a year too late.

Copying Forms. Jansky and deHirsch (1972) found a correlation of .41 between the Bender-Gestalt and reading achievement, reporting this as one of the five best predictors of reading success/failure (eight percent better than chance!). Such a correlation leaves much room for error, especially in the case of an individual child. More important, copying forms has no diagnostic value for instruction; there is no evidence that a child must be able to reproduce forms in order to learn to read.

Visual-Motor Integration. Many people seem unaware of the research disassociating visual-motor activities with reading. Basic studies such as those by Balow (1973), Cohen (1969), Jensen (1970), and others suggest that the Frostig materials (1964) contribute nothing to reading success. This is as far as the present writer is concerned, i.e., the fact that visual motor tests and materials have no bearing on reading success. However, an extensive summary of the research (Hammill, 1974) raises serious doubts as to whether the visual motor skills themselves can be developed through such instruction.

Knowledge of Letter Names. Since Durrell's reports (1958),

knowledge of letter names has been recognized to be equally as good a predictor of reading success as any commercial readiness test. Hillerich (1966) found a correlation of .69 between knowledge of letter names by beginning kindergarten children and their reading achievement at the end of grade one. On the other hand, this test also has no implications for instruction. A child does not need to know the letter names in order to be able to read; he must have established sound associations for the letters, and this is quite different. (For a more extended discussion of evidence on this point, see Hillerich, 1966.) Hence, a test of letter names is another test that correlates with reading success/failure, but that has no diagnostic value for the teacher.

What is Necessary for Success in Reading?

The foregoing items all correlate to some extent with reading success or failure. In that sense they "predict." However, teachers who are more anxious to avoid failure than to predict it must consider what children need for success and how to diagnose for those needs.

The act of reading involves the ability to function in the language, i.e., to think in the language. This means mastery of syntax and a minimal meaningful vocabulary. This in turn presumes auditory discrimination ability, i.e., the ability to hear differences in sounds in words. In addition, reading deals with printed words, so visual discrimination of letters and words is necessary.

Obviously basic to all the foregoing are certain physical conditions. The child must have adequate vision, auditory acuity, and

the general physical health to enable him to attend to learning tasks.

Such prerequisites to reading should be provided in kindergarten for those children who lack them. Beyond this, children need instruction in skills basic to reading. Perhaps the best evidence on this point of instruction is the study by Dunn (1970). Using ninety randomly selected children, ages two through four, she found that time spent in instruction was the significant factor in achievement. While she also found the lowest in socio-economic level gained most, IQ and age were not significant factors in achievement.

Research Method

The PDQ Tests

A battery of tests was constructed of receptive and expressive language elements assumed necessary for success in reading. The items were criterion referenced, each having its own direct implications for instruction if a child did not perform in that area. The entire battery was designed to be administered by kindergarten teachers, since these are the people who would be using the results and the ones who would benefit most from the personal contact with the child. Thus, PDQ was less a screening device and more a diagnostic tool for individualizing instruction in the kindergarten.

The entire battery was designed for individual administration to four and five year olds. It took an average of fifteen minutes per child. Following a pilot project with 153 entering kindergarten children, the battery was revised slightly and consisted of the

following subtests:

1. Auditory Discrimination. This author has been convinced from years of experience that any four-year-old English-speaking child hears differences of one phoneme in a word unless that child has a physical impairment. Wepman (1958) users would disagree; hence it was felt necessary to include a test of auditory discrimination ability.

Basic problems with the Wepman Auditory Discrimination Test are twofold: (a) young children don't always understand "same" and "different" in relation to a spoken word, and (b) auditory memory is a major factor being tested in the Wepman Test (Flower, 1968).

This author developed a test that included the same sound contrasts as the Wepman but avoided the auditory memory problem by making the test of picture pairs and administering it by saying: "I'll name two pictures and then ask you to point to one of them. You point to the one I tell you. Ready? (Point) Shoe, (Point) Sue. Point to shoe."

2. Listening Comprehension. The child was read a story of one paragraph and asked to tell what the story was about. He or she was then checked on six "memories" and a sequence of three major events.

3. Vocabulary. A total of thirty-six pictures were presented for the child to name. These included six items in each category: domestic animals, clothes, tools, foods, vehicles, and wild animals. The child was also asked to identify by name five parts of the body.

4. Ability to Categorize. Using the vocabulary items after

each category was completed, the testor asked the child, "How are all of these pictures alike?"

5. Relationship Words. Using manipulative materials, children demonstrated understanding of thirteen relationship words such as little, in, on, and so on.

6. Picture Sequence. Children were asked to arrange two sets of four picture cards to tell a story. ("Which comes first?")

7. Oral Language Development. Using one of the sets of sequenced pictures, children were asked to tell the story. Their stories were taped, transcribed, and analyzed for length of T-unit. (Hunt, 1965)

8. Following Oral Directions. Children were given one-, two-, and three-step oral directions.

9. Using Oral Context. Seven items ranged in difficulty from general context to the more specific: "Daddy wrote a letter with his new _____."

Visual discrimination was not tested separately because children were using this ability in many test items. Admittedly, many of these children might not distinguish b and d--or possibly even m and n--on a pencil-and-paper test. This, however, is a matter of attending to the detail of letters which may or may not be significant in the child's view. Such letter form discrimination could be tested as a next level to be diagnosed and taught to those children at that point.

Visual acuity (at near-point) and auditory acuity (bell tone) were both tested early in the kindergarten year. These tests resulted in the referral of several children.

Research Method

Subjects

Participants in the project were three school districts in Illinois: the total kindergarten population of Marquardt, District #15 (N = 302); the kindergarten population of six schools in Arlington Heights, District #25 (N = 271); and kindergarteners in four schools in Schaumburg, District #54 (N = 343). Of the total 916 entering kindergarten subjects tested, complete test scores were available on 556 who remained at the end of grade one upon completion of the study.

Procedure

Pre-testing workshops were held with kindergarten teachers and administrators in the three participating districts. The kindergarten teachers in these districts then administered the PDQ diagnostic tests to their entering kindergarten children within the first two weeks of the school year in September.

At least one follow-up workshop was held with kindergarten teachers in each district following their receipt of the scored tests in order to provide direction and suggestions for individualizing the kindergarten program based on the results of the testing.

At the end of the school year, all first grade children in the participating schools were administered the Stroud Primary Reading Profiles, Level One, by their first grade teachers. These test scores were to serve as baseline data against which to measure the effectiveness of the program when the experimental group completed first grade.

Such a procedure has the advantage of controlling teacher variable, since the experimental children in the kindergarten project would have had essentially the same teachers in kindergarten and first grade as did the "control" group. The danger in this kind of study lies in the fact that the population might be different, a factor that was checked with the aptitude subtest of the reading achievement test.

At the end of the second year, when PDQ children completed first grade, they were also administered the Stroud Primary Reading Profiles, Level One, to serve as a measure of the effect of the PDQ program on their reading achievement as contrasted with the previous year's first graders.

Results of PDQ Testing

Table 1 shows the results of PDQ testing of entering kindergarten children in the three school districts. Means are given to provide the reader with some feeling for the kinds of skills possessed by these children. Means were not pertinent to kindergarten teachers, who were concerned with providing experiences in identified areas of weakness for the individuals who did not perform well in those areas.

As shown in Table 1, few children experienced difficulty with auditory discrimination (#1), knowledge of parts of the body (#6), relationship words (#7), following oral directions (#11), or the use of oral context to name a missing word (#12). Oral language development, as measured by number of words per T-unit (#10), is about average according to other studies of five-year-olds. (Templin, 1957; O'Donnell, 1967; Loban, 1963)

Listening comprehension (#2), sequencing (#3, #8, #9), and the ability to generalize (#5) were the weakest areas.

Table 1

Results of PDQ Testing (September, 1974)

in Three School Districts (N=916)

		Possible Score	Mean Score
1.	Auditory Discrimination	39	37.2
2.	Listening Comprehension	6	4.1
3.	Recalling Sequence	100%	47%
4.	Vocabulary	36	31.2
5.	Ability to Generalize	6	3.9
6.	Knowledge of Body Parts	5	4.9
7.	Relationship Words	13	11.6
8.	Picture Sequence #1	100%	36%
9.	Picture Sequence #2	100%	25%
10.	Oral Language (Words/T-unit)	--	5.2
11.	Following Oral Directions	12	10.9
12.	Using Oral Context	7	6.6

While such summary data were provided to kindergarten teachers, these data were merely an overview; attention was drawn to the individual children and their individual subtest scores.

Results of Reading Achievement Testing

Reading achievement tests were administered to the control groups in May, 1975, and to the experimental groups in May, 1976.

Table 2 shows results of aptitude tests administered at the end of grade one to experimental and control groups.

Table 2. Results of Aptitude Testing at the End of Grade One

	N	S.D.	Mean	t
Control	881	4.30	20.1850	1.5290 ($p > .10$)
Experimental	555	4.56	20.5477	

As shown in Table 2, there was no significant difference in aptitude between the control and experimental groups. Hence, it may be assumed that they were equal in ability.

Table 3 shows results of reading achievement tests administered at the end of grade one to experimental and control groups.

Table 3. Results of Reading Achievement Testing at the End of Grade One

	N	S.D.	Mean	t
Control	890	18.60	96.3179	4.5600 ($p < .01$)
Experimental	556	15.65	100.4694	

Table 3 indicates a significant difference in mean reading achievement in favor of the experimental group. A significant difference in variance of the group's scores is reflected in the observable difference in standard deviation, where the experimental group had a higher mean score and less variance about the mean.

While it was hoped that individualization would have a positive effect on the total experimental group in terms of reading achieve-

ment, the focus of PDQ testing and activities was to provide needed language skills for children at the lower end of the continuum. With this in mind, the lowest third of the control group was identified (N = 297). Their scores ranged from 26 to 92 on the reading achievement test. Using this same score of 92, which encompassed 33% of the control group, it was observed that only 22% of the experimental group fell at or below that score. This difference in percentages, tested by Chi Square with one degree of freedom, was significant beyond .01.

Discussion

PDQ Testing

If instruction is to be effective and to account for individual differences in the kindergarten, two major points must be recognized from the data provided in the PDQ testing:

1. Most of the children were further advanced in language development than we often give them credit for being; hence, such children need instruction that proceeds from this point.
2. Some children were identified who were not as advanced in their language development as all are often assumed to be; for these, special language activities are required. In fact, there were a few children in the program who did not understand instructional terms such as <u>in</u> or <u>on</u>.

Kindergarten teachers indicated that the PDQ testing was one of the most pleasant ways to introduce kindergarten children to the school situation: Those children had the undivided personal attention of their teacher, and they played "games" in which--in their

view--they could not fail. Furthermore, several teachers commented on the absence of separation problems or crying on the first days of actual class.

Effect on Reading Achievement

As shown in Table 3, reading achievement was significantly higher for the experimental group. Further, only twenty-two percent of the children in the experimental group fell at or below a score of 92 on the reading achievement test, the point that separated thirty-three percent of the control group. Hence, the results indicated that early diagnosis and efforts to individualize in the kindergarten had an impact on later reading achievement.

This effect on reading achievement was apparent despite three serious limitations of the study. First of all, the reading achievement test did not have a high enough ceiling to measure adequately the level of a large portion of the children. While scores ranged from 26 to 116 for the control group and from 36 to 116 for the experimental group, 42.8% of the control group and 50.7% of the experimental group fell within a range of 107 to 116 points, at the top of the test.

Second, as also pointed out by Durkin (1974-75), it does little good to alter the curriculum at one level if subsequent levels are not adjusted to meet the change. While there was some in-service work with kindergarten teachers, there was none with first grade. Some first grade teachers might have made adjustments on their own, but they were involved only to the extent of administering the reading achievement tests at the end of each of the two years.

Third, the PDQ battery appeared helpful in diagnosing pre-reading needs of those children at the lower end of the continuum. If we are to individualize for all children, the level and needs of the majority--those with adequate language and experience backgrounds--must also be determined. Such a battery would extend through basic reading skills and include an oral reading test for those who are already reading.

In conclusion, it would seem that efforts to diagnose needs and to individualize the kindergarten program were rewarded in terms of increased reading achievement. Subsequent studies ought to provide for follow-up work with teachers at first grade and higher levels; secondly, reading tests used ought to provide for a higher ceiling than was provided for in the current study.

(The author will send a list of suggested follow-up activities for these skills to any readers who include a stamped, self-addressed envelope with their request.)

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